GROW BY DEGREES

A Campaign of the Virginia Business Higher Education Council

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Higher Education Research and Economic Development in Virginia

2000 – 2010

Where Do We Go From Here?

Higher Education -- The New Paradigm for Economic Development?

- Transition to knowledge economy underway
- Traditional economic incentives – financial packages, labor policy, road and water systems etc – to become less important
- Universities and community colleges keys to helping states advance through
  - Educational attainment
  - **Innovation,** including the commercialization of higher education research
  - Knowledge transfer and technical assistance
  - Community engagement and revitalization

Source: The Nelson A. Rockefeller Institute of Government

Executive Summary…

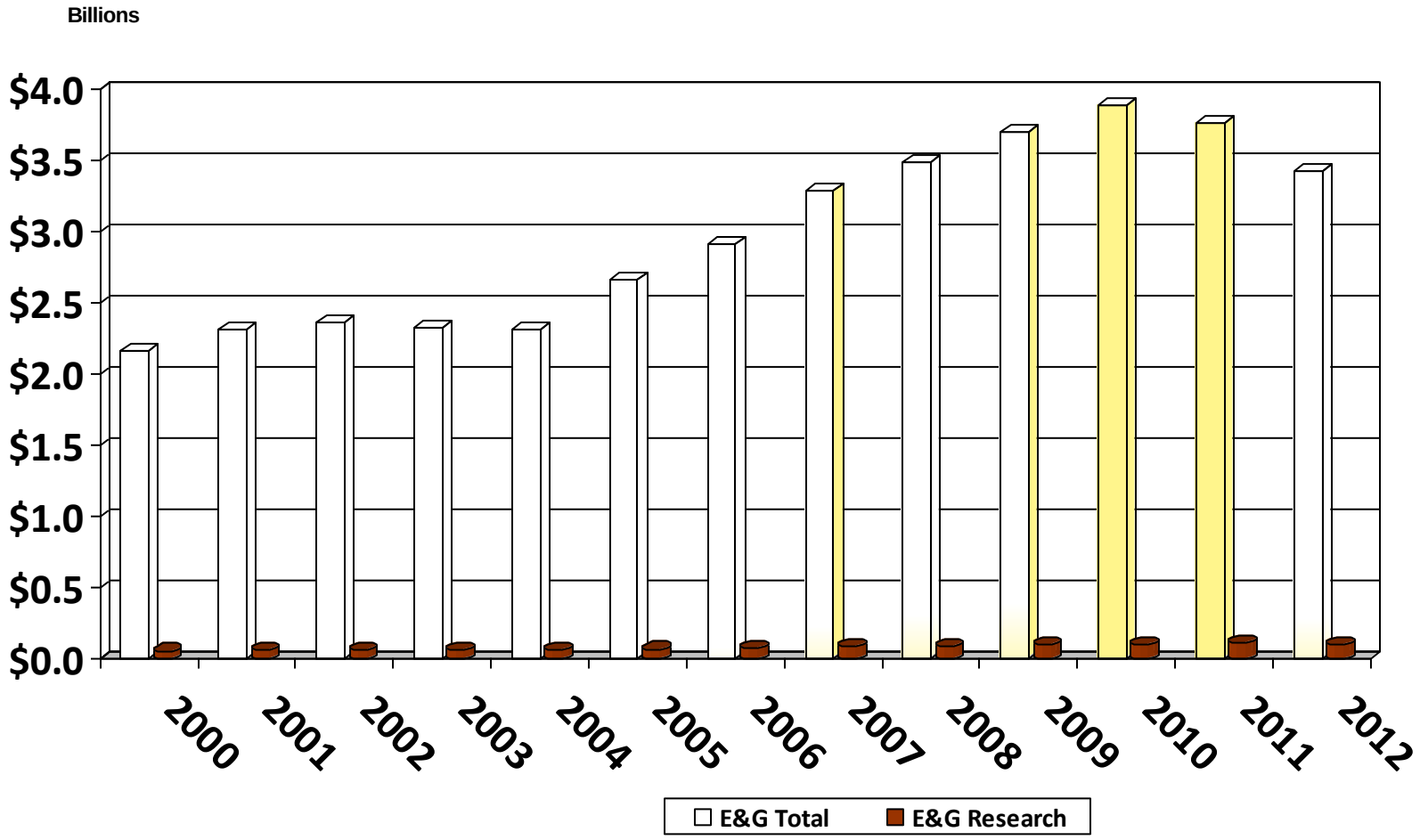
- State financial support for commercialization of higher education research in VA has been erratic.
- Compared to the leading states, VA lags in the use of its universities to promote economic development.
- VA ranks 41st in Academic R&D spending per $1,000 of Gross State Product and 36th in Academic Patents per 1,000 Science and Engineering Doctorate holders in Academia.*
- Virginia's principal entity for supporting commercialization of research by VA's institutions has no money.
- Without a sustained commitment that transcends gubernatorial administrations, VA's research universities will not achieve their full potential to foster economic development through innovation.

*Source: National Science Foundation: Science and Engineering Indicators 2008 – Tables 8-35, 8-39

Appropriations for Higher Education Research contained in two parts of the state budget…

- Education and General (E&G) Programs
  - Instruction
  - *Research*
  - Academic Support
  - Student Services
  - Institutional Support
  - Operation and Maintenance of Physical Plant
- Reflects assumption that all faculty are engaged in instruction, research and service
- Research accounts for 3 percent (all funds) of the $3.8 billion E&G budget in FY 2010
- Financed by state general funds, tuition, and fees

Historically, E&G research has been a very small part of the total E&G Budget…



Appropriations for Higher Education Research contained in two parts of the state budget…

- <u>Financial Assistance for E&G Services</u>
  - Eminent scholars
  - Sponsored programs
- 99 percent of the $1.2b sponsored programs budget for FY 2010 reflects grants and contracts from federal, private and other sources. State acts as pass-through agent.
- VT, UVa and VCU account for 67% of the total

Appropriations for Higher Education Research contained in two parts of the state budget…

- Direct state support for research is also contained in Sponsored Programs.
  - Amounts to $17.9m in FY 2010
  - Category most directly tied to economic development through commercialization of research

Briefing Outline

- The Setting – Common Concerns and Findings
- Administration and Oversight
- Funding
- Potential Issues for Consideration

The Setting – Common Concerns and Findings…

- Two studies with similar findings
  - "*Condition of Research at Virginia's Colleges and Universities*", State Council for Higher Education in Virginia (SCHEV), 2002
    - (Report of the Governor's Steering Committee on Research Capabilities and Centers of Excellence [Steger Report] provided recommendations based on SCHEV findings)
  - "*Catalyzing Innovation in the Commonwealth of Virginia*", prepared by SRI International for the Virginia Economic Development Partnership (VEDP), 2008

SCHEV: Condition of Research at Virginia's Institutions of Higher Education (2002)

- Virginia ranked 16th nationally (2000) in academic R&D expenditures
- A big however:
  - Top 4 states accounted for 33% of total academic R&D expenditures
  - Top 15 accounted for 70%
  - Adjusting for population, Virginia ranked 37th
  - As a percent of gross state product, Virginia ranked 39th

Other findings from SCHEV 2002 report…

- Virginia's schools lagged behind the top national research universities in terms of world-renowned researchers
- Our faculty were not as productive as their peers in generating research support
- Based on Fiscal 2000 R&D Expenditures,
  - VT ranked 51st
  - UVa ranked 58th
  - VCU ranked 106th

Other findings from SCHEV 2002 report…

- Historically, undergraduate education a higher priority
- Lack of policies that support and foster academic research
- Minimal investments in research faculty
- Successful state R&D initiatives share similar characteristics:
  - Focused areas of research
  - Long term and sustained investments; and
  - Collaboration among higher education, government, business/industry

SRI's 2008 Study (at Request of Virginia Economic Development Partnership) …

- Objective: "…comprehensive, independent assessment of VA's technology and research and development situation from the perspective of economic development."
- VA compared to 9 states based on
  - Gross state product
  - Similar high tech focus
  - Reputation of state as traditional regional competitor

SRI's 2008 Study…

- Benchmark states: CA, FL, GA, MD, MA, NY, NC, PA, WA
- Categories examined
  - Financial resources
  - Human resources
  - Innovation resources
  - Innovation economy performance

SRI's 2008 Study…

- Key higher education findings:
  - VA ranked near bottom of peer states in total academic R&D expenditures per capita and per capita R&D expenditures
  - Room to expand graduate level R&D in strategic scientific and engineering fields
  - VA did not rank highly against peers on indicators of entrepreneurial activity
  - Critical mass of talented faculty with commercialization experience and interest in strategic technology fields is an advantage in enhancing entrepreneurship

2008 SRI Report observed that…

- Increased funding alone not sufficient to create environment conducive to technology commercialization
- University faculty have had cultures that reward academic research over research with commercial application
- Eminent Scholars programs and competitive funding for Centers of Excellence can enhance interest in commercialization
- VA could benefit from greater collaboration among universities, federal labs, corporations, nonprofits

SRI Report Recommendations…

- Establish three distinct programs
  - **Virginia Research Excellence Program** to expand funding for research in strategic technology areas at Virginia schools
  - **Virginia Scholar Program** to assist in the recruitment and retention of world-class researchers
  - **Virginia Entrepreneurial Support Program** to provide grants to enhance technology commercialization and establish or expand technology-based entrepreneurial training and start-up support programs through partnerships with venture capital firms, incubators, etc.

SRI Report Recommendations…

- Some suggest that an investment of $45 – 50 million for each of the next 5 years would be required to make a serious effort.
- To be successful, a serious initiative needs to be sustained across gubernatorial administrations.

Briefing Outline

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First Steps – Creation of the Commonwealth Technology Research Fund in 2000…

- Approved by the 2000 Session of General Assembly
- $24.6m in state funds expended from FY 2002 – 2004
- Funds awarded on a one-time basis to three components
  - Matching Funds to Leverage federal/private money
  - Strategic Academic Enhancement
  - Industry Inducement
- 2001 Session codified the CTRF and role of the Virginia Research Technology Advisory Committee (VRTAC)
- Enhancement of capability to commercialize technologies developed through research added by 2003 Session

Today, oversight of research commercialization is a shared responsibility between Executive and Legislative Branches…

- Innovation and Entrepreneurship Investment Authority (IEIA) created in 2009 by merging VRTAC and Innovative Technology Authority (ITA).
  - Since 1984, ITA reported to the executive branch
  - VRTAC had existed since 2001 in an advisory capacity
- IEIA Membership
  - Secretary of Technology (ex-officio)
  - Three university presidents appointed by Governor
  - Three citizen members appointed by Governor
  - Three citizen members appointed by Speaker of the House
  - Three citizen members appointed by Senate Rules Committee

Charge to the IEIA…

- Collaborate with universities to develop strategy to guide research and development priorities
- Receive reports on progress of programs funded through the Commonwealth Research Initiative, CRCF, and CTRF.
- Foster partnerships and opportunities among universities, federal labs, not-for-profits, and private sector (i.e., Rolls Royce)

IEIA to Grant Awards From the Commonwealth Research Commercialization Fund in Four Programs…

- Areas of focus – energy, conservation, environment, microelectronics, lifespan biology/medicine, robotics, unmanned vehicle systems, advanced shipbuilding
- Award of funds to emphasize collaboration and partnerships between universities and business/industry
- The 2010 – 12 budget contains no money for the CRCF

Briefing Outline

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The 2000 decade brought three funding initiatives to strengthen higher education research…

- Gilmore: Commonwealth Technology Research Fund (2000)
- Warner: 2004 “Seed Money” Initiative
- Warner: 2006-08 Commonwealth Research Initiative (operating and capital)

These funding initiatives took the form of …

- Direct funding to specific institutions
- Pooled funding to encourage schools to engage in commercialized research
- Despite these efforts,
  - Funding levels under both approaches have ebbed and flowed with economic conditions
  - Today, support for higher education research is substantially reduced compared to previous years

CTRF Funding Peaked in 2000-02…

- From FY 2002 – 2004, four schools spent $24.6m in state funds on 12 projects. State funds were supplemented with university match.
  - Strategic enhancement -- $16.2m
  - Matching funds -- $1.7m
  - Industry inducement -- $4.4m

2004 Legislative Session produced 2nd major funding initiative…

- One-time “seed money” for research
- Target – collaborative, translational research aimed at commercialization of higher education discoveries

2004 Seed Money Initiative Provided $8.3m for numerous programs at W&M, GMU, JMU, ODU, UVA, VCU, VIMS and VT …

- Materials by Design Research ($324,800)
- Innovative Coastal and Environmental Science ($1,268,000)
- Security Research ($150,000)
- Computation and Modeling Research and Partnerships ($740,375)
- Computer and Information Science and Engineering Research ($1,322,950)
- Morphogenesis and Regenerative Medicine Research ($1,214,550)
- Cancer Research ($1,218,000)
- Virginia Neurosciences Institute ($761,250)
- Host-Pathogen-Environment Interaction ($1,265,000)

2006 Legislative Session produces 3rd major funding initiative…

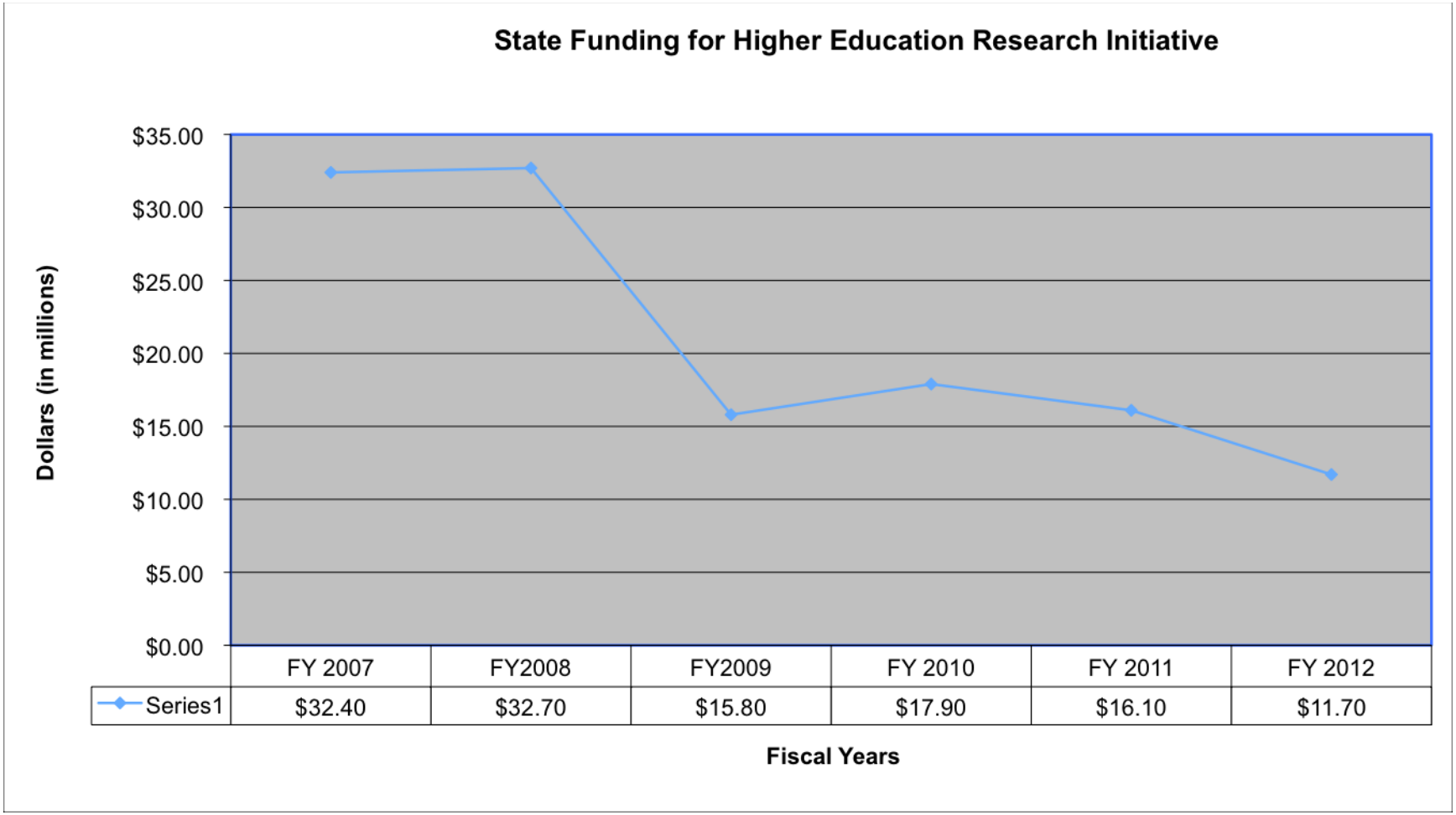
- Three components: enhancing capacity within departments, building research facilities, and equipping labs
- Research-related capital program - $83.1m (GF)

School	Project	$ millions
GMU	Academic IV & Research II	25.0
GMU	Bio-containment Lab	2.5
UVA	Clinical Cancer Center	25.0
VCU	Massey Cancer Center Addition	6.0
VCU	Medical Sciences Bldg Supplement	8.0
VT	Institute – Critical Tech. & Applied Science	13.5
VT	Infectious Disease Research Facility	3.1

In summary, the 2006 - 08 Biennial Budget Appropriated $65.1 in State Funds for Directed Research of all kinds…

Agency	Research Initiative	GF Biennial Total
CWM	Biomedical research and biomaterials engineering	400,000
UVA	Bioengineering and regenerative medicine	11,450,000
	Cancer research	
VPI	Bioengineering, biomaterials, and nanotechnology	15,050,000
ODU	Modeling and simulation	8,000,000
VCU	Biomedical engineering and regenerative medicine	6,200,000
	Cancer research	
GMU	Biomedical and biomaterials engineering	6,000,000
EVMS	Medical modeling and simulation	3,000,000
IALR	Continued research	4,445,587
Subtotal	**Funding in Individual Institutions' Budgets**	**$54,545,587**
	Commonwealth Technology Research Fund	6,000,000
	Virginia Economic Development Partnership	600,000
	Christopher Reeve Stem Cell Research Fund	500,000
	Virginia Coastal Energy Research Consortium	1,500,000
Subtotal	**Pooled Funding in Central Accounts**	**$10,600,000**

State funding has been reduced by almost two-thirds due to recent recessions…*



**Most recent appropriation, Higher Education Research Initiative*

Briefing Outline

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Potential Issues for Consideration…

- How can funding streams be made long term and protected from economic downturns?
- Is it possible to identify a dedicated revenue stream?
- Does it make sense to enhance research capacity through direct appropriations to high performing departments as well as to competitive commercialization pools? If so, what is the proper balance?
- Should VA model other states in orienting its Eminent Scholars program toward faculty who engage in commercialized research?
- Should VA model other states in funding Centers of Excellence that pursue commercialization of research?

Potential Issues for Consideration (con't)…

- How should the Commonwealth measure its return on investment in commercialized research at our universities?
- Should VA's universities be encouraged to use promotion and tenure policies to encourage faculty to commercialize research in appropriate disciplines?
- Do new models need to be considered for sharing proceeds from commercialized research?
- How should Virginia ensure that workforce education and training closely follow investments in research commercialization?

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2001 Session Changes to Oversight of CTRF……..pp. 44

2003 Session adds 4rth Component to the CTRF……pp. 45

Commonwealth Commercialization Research Fund Four Programs…….pp. 47

Glossary

- CRCF – Commonwealth Research Commercialization Fund
- CRI – Commonwealth Research Initiative
- CTRF – Commonwealth Technology Research Fund
- DPB – Department of Planning and Budget
- E&G – Educational and General Programs
- GF – general fund (unrestricted state tax money)
- HERI – Higher Education Research Initiative
- IEIA – Innovation and Entrepreneurship Investment Authority
- NGF – nongeneral funds (tuition, grants and contracts, etc)
- SCHEV – State Council for Higher Education in Virginia
- ITA – Innovative Technology Authority
- VEDP – Virginia Economic Development Partnership
- VRTAC – Virginia Research Technology Advisory Committee

Glossary (con't)…

- Virginia Institutions of Higher Education
  - EVMS (Eastern Virginia Medical School)
  - IALR (Institute for Applied Learning and Research)
  - JMU (James Madison University)
  - GMU (George Mason University)
  - ODU (Old Dominion University)
  - VCU (Virginia Commonwealth University)
  - UVA (University of Virginia)
  - VT (Virginia Polytechnic and State University)
  - W&M (College of William and Mary)

1st CTRF Component – Matching Funds to Leverage Federal and Private Research Money

- Schools having difficulty generating matching funds
- Matching funds seen as way of influencing decision makers of the state's commitment
- Funds not to be disbursed unless a school's grant proposal was successful at the federal level

1st CTRF Component – Matching Funds to Leverage Federal and Private Research Money…

- Targeted funds and research linked to economic development
  - Aerospace
  - Biotechnology
  - Energy
  - High performance manufacturing
  - Telecommunications
  - Transportation
  - Environmental and information technologies

2nd CTRF Component – Strategic Academic Enhancement Program…

- Objective – enhance research capacity in academic departments that demonstrate ability to perform innovative research in technology fields
- Assumption – Top ranked departments are most successful in attracting external research money
- Specifics – Recruitment packages, specialized equipment, renovation of labs, graduate teaching assistants, etc

3rd CTRF Component – Industry Inducement…

- Objective – Upgrade academic departments in pursuit of locating or expanding industrial prospects
- Suggested by the Virginia Economic Development Partnership (VEDP), which would
  - Work with prospect firms to identify required enhancements to the schools' research capacity
  - Receive competitive proposals from schools
  - Select programs to recommend based on consultation with prospect firms and academic/industry advisory group
- Money to be used for faculty recruitment, equipment, lab renovations, graduate teaching assistants, etc

2001 Session resulted in changes to the oversight of the fund…

- VRTAC comprised of 27 members
  - 2 from House of Delegates
  - 1 from Senate
  - 20 citizen members representing higher education, federal labs, research and technology industry,
  - Secretaries of Commerce and Trade, Education, Technology
  - Director of State Council for Higher Education

2003 Legislative Session adds 4th component to the CTRF…

- Emphasis on scientific merit and economic development in
  - Aerospace
  - Biotechnology
  - Energy
  - Environmental and information technologies
  - High performance manufacturing
  - Telecommunications
  - Transportation

Today, oversight of research commercialization is a shared responsibility between Executive and Legislative Branches…

- Among the nine citizen members –
  - Three: founding members of technology companies with a minimum of $5m of institutional venture capital
  - Three: at least five years experience as a venture capital partner in a fund with a minimum of $250m of limited partner investment
  - Three: experience as senior executives in research and development-based companies with annual revenues in excess of $50m

IEIA to Grant Awards From the Commonwealth Commercialization Research Fund in Four Programs…

1st Program – Fund balance <$7m: matching grants up to $50k for applicants receiving a federal Small Business Innovation Research Phase 1 award from NIH

2nd Program – Fund balance >$7m: matching grants up to 100k for applicants receiving federal Small Business Innovation Research award or Small Business Technology Transfer Program Phase I award and up to$500,000 for Phase II awards

3rd Program – Matching funds to help institutions leverage federal and private funds for commercialization of qualified research or technologies

4th Program – Facilities enhancement loans to help institutions and political subdivisions provide lease or credit guarantees to assist in financing facilities used for commercializing qualified research or technologies